

SIERRA CIRCUITS, INC.

***CELEBRATING
25 YEARS***



**THE LEADER IN
QUICK-TURN HDI PCBs**

www.protoexpress.com





1108 West Evelyn Avenue
Sunnyvale, CA 94086
www.protoexpress.com

Dear Customers:

The year 2011 marks our 25th anniversary in the PCB industry. We are proud of our commitment to our customers, our longevity in this industry, and thankful to you for allowing us to serve your PCB needs over all these years. As we all know, the trends toward smaller devices, tighter form factors, and smaller geometries are pushing the design limits of conventional, single-lamination PCBs. Therefore, in this banner year for Sierra Circuits, we are implementing a new vision to continue as a leader over the next decade.

Welcome to the World of HDI PCBs

OUR MISSION:
To be the most convenient partner for PCB designers in executing their High Density Interconnect PCB designs.

Pre-design: Reducing design time by providing manufacturing-ready HDI stackups.
Post-design: Delivering quality HDI boards in quickest turntime in the industry.

While collaborating on dozens of HDI designs every month, we see how PCB designers go through a difficult time with the HDI manufacturing processes. We admit, when it comes to HDI, the PCB manufacturing industry has not been helpful to the design community.

So, we have decided to help!

How? By creating tools to make your job easier. One popular example is a piece of software which asks only a few questions about your design, then recommends relevant starting HDI stackups which are optimized for manufacturing, reliability and cost.

To date we have created the following software tools:

- HDI Stackup Planner with cost-indexes
- PCB Material Selector
- Interactive Impedance Calculator

In the years to come, we will continuously improve our services to you—consistent with our mission to be your most convenient partner in your HDI journey. We have also expanded our services to include Microelectronics (sub 2 mil features) and rigid-flex PCBs, (specifically for the Medical Device, Military and Aerospace industries). It should also be noted that we recently received the prestigious ISO 13485:2003 certification for PCB Fabrication and PCB Assembly.

In this, our 25th anniversary year, we are stronger than ever and look forward to the next 25 years of serving your PCB and Assembly needs.



Best Regards,

Ken Bahl
CEO, Sierra Circuits, Inc.
ken@protoexpress.com

COMPANY HISTORY

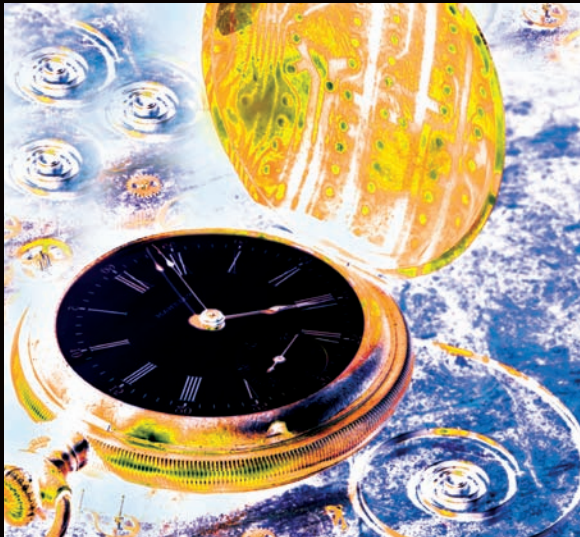
Sierra Circuits was founded by Ken Bahl in 1986 with the vision of becoming the premier full service prototype PCB manufacturer in the United States.

An *unwavering commitment to service excellence* over the last 25 years has enabled us to fulfill that vision. We know that service excellence is never an accident. It is always the result of high intentions, sincere effort, intelligent direction and skillful execution. With these thoughts we set out to create a growth organization and the result was Sierra Circuits, Inc.

A business idea is worthwhile only if it provides value for its customers. We believe that our success is tied simply to making our customers successful—whatever it takes.

For example, we continuously work with our best customers to identify future trends, then set out to build the capabilities to meet those needs. When our customers are ready for their next technological leap, so are we.

It is with this philosophy that we started a company which manufactured double-sided technology 25 years ago and today we are manufacturing complex HDIs, micro HDIs and rigid-flex micro boards for companies like Boeing, Siemens Medical, and Apple.



Through the various economic cycles in the PCB industry our business has continuously grown and provided unparalleled quality, technology and service for the customer by following three overall philosophies:

1. Continuous Investment in Equipment, People and Processes

- In the last 10 years we invested over \$40 million in new facilities and equipment
- In the last 5 years we spent \$5 million in R&D
- We have dedicated our team to Lean Management techniques which are providing a foundation for high-paced growth

2. Focus on Financial Stability

- We have never had an unprofitable year in our existence
- For the last 5 years we had a compounded 15% growth
- For the next 10 years we are planning for compounded 25% growth

3. Unwavering Commitment to Our Customers

- Our on-time delivery for the last 5 years has been nearly 99%
- Our quality performance is above 99%, internally and externally
- We continuously introduced new technology and services. HDIs, microelectronics, rigid-flex, and R&D assemblies
- We now offer free software services to help our customers in the design stage

We fully intend to continue this effort to service you better in the coming decade.

MARKETS WE SERVE

HDI

PC Boards • Components • Assembly

R&D Assembly

Components • Boards • Assembly

Flex & Rigid Flex

Medical • Military • Instrumentation

Micro Electronics

Medical • Military • Instrumentation

Metal Core PCBs

Military • Heavy Equipment

High-Reliability PCBs

Down Hole • Heavy Copper

Standard-Custom PCBs

All Markets

Web PCBs

All Markets

Off Shore Services

All Products & Markets

Capabilities

QuickTurn HDI's

P.C. Boards – Components – Assembly

- Turnkey Prototype HDI Assembly in 5 days
- Stacking of filled vias to increase feature density
- Thinner materials, better electrical performance
- .4 mm pitch BGA, .3 mm pitch BGA, .25 mm pitch BGA
- Production: Lines and spaces of 50 micron (2 mil)
- Production: Via and pad sizes of 4 mil via/8 mil pad

R&D Assembly

- Same Day Assembly, 1 board okay
- Passives down to 0201 size
- Fine Pitch CSP, BGA, microBGA
- State-of-the-art Juki machines
- RoHS
- X-Ray and AOI inspection
- BGA Repair

Flex and Rigid Flex

Medical—Military—Instrumentation

- Single, double layer flex with fine lines
- Quick Turn Flex, Rigid-Flex
- Blind and Buried Vias
- Production: Lines and spaces of 75 micron (3 mil), microvia and pad of 4 mil via/10 mil pad
- R&D: Lines and spaces of 50 microns and below

Fast Microelectronics

Medical – Military –Instrumentation

- Lines and spaces at 50 microns and below
- Reduction of form factor, increase functionality
- State-of-the-art equipment
- Low CTE metal core, Copper Invar Copper
- Fast R&D Projects – 4 weeks
- R&D: Via and pad 65 microns or less

Simple Metal Core PCBs

- Military, Aerospace, Down-Hole Markets
- High Reliability, Heavy Copper
- Heavy Copper Embedded Traces
- Aluminum Core
- Copper Invar Copper (CIC)
- Materials: FR4, Polyimide, Rogers, Thermagon

High Reliability Boards

- Burn in Boards
- Heavy Copper
- High Reliability
- Heavy Copper Embedded Traces

Custom PCBs

- Quick Turn prototype and medium production
- 2 to 30 layers
- Controlled Impedance
- RoHS Compliant
- Rogers, Polyimide, Nelco, Taconic, Arlon
- Line and space: 3 mil and above
- Filled Vias, Plated Edges

Web PCBs

- Low cost, self-service, quick turn, buy online
- Free automatic file verification
- 1 to 5 day turn time, 2 to 12 layers
- ENIG, Lead Free HASL, Immersion Silver, ENEPIG
- Options for different thicknesses

Offshore Connection with China & Taiwan

- 1 to 40 layer capability
- Formal qualification procedure for process and products
- Formal schedule for periodic re-certification of processes and products
- ISO 9001:2000, QS9000/TS16949:2002, UL, IPC



Certifications

COMPANY CERTIFICATIONS

ISO 13485:2003

ISO 9001:2008

Mil-P-55110

ITAR

UL

RoHS

**Woman-Owned Business
Minority Business Certification**



COMPANY CERTIFICATIONS



Certificate of Registration

This is to certify the Quality Management System of:

SIERRA CIRCUITS, INC.

1108 West Evelyn Avenue
Sunnyvale, CA 94086

and

306 Potrero Avenue
Sunnyvale, CA 94086

Has been assessed and found to be in compliance
With the following Quality Standards:

ISO 9001:2008 & ISO 13485:2003

The Quality Management System is applicable to

**Manufacturing of Printed Circuit Boards and Assembly for
Electronics, Military, Aerospace & Medical Device Industries.**

The Registration period is from:

April 27, 2011 to December 14, 2012

This registration is subject to the company maintaining its system
To the required standard which will be monitored by SARA Registrar.

Certificate Identification Number: **SARA-2003-CA-0009-03-C**

Original Certification Date: December 15, 2009



A handwritten signature in black ink, appearing to read "Ward".

President

Ph: 1-800-699-5870 Fax: 1-800-803-4818
1807D Santa Rita Road, #175
Pleasanton, CA 94566

SOFTWARE SUPPORT FOR PCB DESIGNERS

PCB Material Selector

The PCB Material Selector helps System Engineers and PCB Layout Designers search for materials that fit their application criteria; For example, designers can search on IPC revisions, Slash numbers, Tg, Dk, Lead-free compatibility, etc.

The Material Selector report shows the relevant materials that match your criteria and also allows you to compare them.

HDI Material Selector

Benefits of Material Selector

- Quickly find the PCB materials suitable to your application.
- Get details for any given material.
- Choose and Compare materials side by side.

1. Application

Application Type: High Speed Applications Lead Free Assembly

2. Filter results by IPC and Slash number

IPC Number: All
Slash Number: All

3. Material Characteristics

CAF resistant: Yes

Select a range for Tg°C: 138 - 289

Dielectric Constant: All @ 100MHz @ 10Hz @ 100Hz

Loss Tangent: All @ 100MHz @ 10Hz @ 100Hz

4. Family Name and Manufacturer

Family: FR-4
Material Manufacturer: All

Find Material

HDI Material Selector

Benefits of Material Selector

Quickly find the PCB materials suitable to your application. Get details for any given material. Choose and Compare materials side by side.

51 matching materials found

Clear	Compare	Manufacturer Name	Material Name	Tg°C	Lead Free Assembly Compatibility	Dielectric Constant			Dielectric Loss			More Details
						(Dk at 100MHz)	(Dk at 1GHz)	(Dk at 10GHz)	(Df at 100MHz)	(Df at 1GHz)	(Df at 10GHz)	
<input type="checkbox"/>	<input type="checkbox"/>	Arion	55 NT	170	Yes	3.80			0.0150			More
<input type="checkbox"/>	<input type="checkbox"/>	Isola	FR 406	180	Yes	3.80	3.70	3.63	0.0100	0.0100	0.0130	More
<input type="checkbox"/>	<input type="checkbox"/>	Isola	FR 408 HR	200	Yes	3.80			0.0080			More
<input type="checkbox"/>	<input type="checkbox"/>	Isola	FR 410	175	Yes	4.20	3.90		0.0230	0.0210		More
<input type="checkbox"/>	<input type="checkbox"/>	Isola	IS620	225	Yes	3.58	3.54		0.0059	0.0071		More
<input type="checkbox"/>	<input type="checkbox"/>	Isola	370 HR	180	Yes	4.30	4.17	4.03	0.0160	0.0230		More
<input type="checkbox"/>	<input type="checkbox"/>	Nan Ya	NP-175F	170	Yes	4.45	4.10		0.0190	0.0140		More
<input type="checkbox"/>	<input type="checkbox"/>	Nan Ya	NP-170	170	Yes	4.70	4.20		0.0150	0.0130		More
<input type="checkbox"/>	<input type="checkbox"/>	Nelco	N4000-11	170	Yes	4.30	4.10		0.0160			More
<input type="checkbox"/>	<input type="checkbox"/>	Nelco	N4000-11EP	200	Yes	3.80	3.70	3.60	0.0090	0.0090		More

Interactive Impedance Calculator

Most HDI designs have controlled impedance considerations. We provide impedance calculators for all the different scenarios like Single Ended Solder Mask Coated Microstrip, Coupled Stripline etc. Our interactive impedance calculator works on the Standard stackups we provide to help calculate trace geometries for your specific impedance requirements.

Coupled Embedded Microstrip TRACE WIDTH(W) CALCULATOR

Diagram showing a cross-section of a coupled embedded microstrip structure with layers H2, T, and H1, and dielectric constants Er. The top layer (H2) contains two yellow traces of width W separated by a distance S. The middle layer (T) is a thin layer of thickness T. The bottom layer (H1) is a thicker layer of thickness H1. The dielectric constant Er is indicated for the top and bottom layers.

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Dielectric Height 1 (H1): 4.0 mils

Dielectric Constant (Er): 3.9

Dielectric Height 2 (H2): 2.6 mils

Trace Width (W): **3.93** mils

Traces Separation (S): 6.0 mils

Trace Thickness (T): 1.0 mils

Differential Impedance (Zd): 99.97 ohms

Calculate

12 REASONS FOR CHOOSING SIERRA AS YOUR PARTNER IN PCBS

Our Attributes

Your Benefit

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. An obsessive attention to detail, and a culture of quality. A 99% acceptance rate. | You can be assured of getting what you want, when you want it. |
| 2. Evidence of Quality documents sent with every order. | You can ship your product to your customers with confidence. |
| 3. ISO 9001, ISO 13485, MilSpec, and NASA Certified. | You can be sure, and assure your customers, that you are dealing with a quality vendor. |
| 4. Ability to manufacture a full range of PCB technologies. Recently invested \$15 Million in high tech manufacturing equipment and process technology. | You can satisfy your complete competitive and technical needs with one PCB Vendor. |
| 5. 99%+ On-Time Delivery. | You will meet your schedule. |
| 6. Aggressive, competitive pricing and a commitment to cost reduction through innovation. | You will stay within your budget and receive value for your money. |
| 7. A full range of products and pricing from \$34 'No Touch' PCB online to custom-pricing high technology boards. | You can select the level of service that matches your technology and pricing needs. |
| 8. An Account Representative assigned for every account. | Whether you are a large or small customer you have someone assigned to service your needs. |
| 9. You have access to our technical support staff 24 hours a day. Web quotes and order placement is available 24 hours a day. Sales office is open 7 A.M. to 6 P.M. PST. | You can place an order and get around the clock technical help at your convenience. |
| 10. 500 years of collective PCB Manufacturing management experience. Technical support reviews every design. | Your designs will be more manufacturable and cost effective after our engineers work with you. |
| 11. Same Ownership for 25 years. | You can count on us through thick & thin. |
| 12. An Unconditional Guarantee. | We are committed to your total satisfaction. If there is ever any issue with our product or delivery — WE WILL MAKE IT RIGHT. No excuses. No hassles. |



Continuous Improvement Is In Our DNA

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Feedback TESTIMONIALS

Our customer feedback is a great testimonial to the outstanding service we provide.

Dear Sierra Circuits,

"Silver Engineering Inc. has almost exclusively been working with Sierra Circuits for the last 5 years. Sierra Circuits has produced many designs for us. The team at Sierra Circuits, has been great to work with, from sales to engineering, the entire staff has been helpful and informative. Your staff has treated our company as an extension of their company, which is a nice working relationship. The printed circuit boards that we have received have been good quality boards. We are very pleased to be working with Sierra Circuits."

— **Janet Clifford, Sr. Engineering Technician, PCB Designer**

"...in the past with other vendors the issues would get bogged down in the emails. However with your live support all my apprehensions have been laid to rest. I would most certainly recommend your service to my friends, ex colleagues in the industry whenever I get a chance to do so."

— **Embedded Systems Engineer, Jackson, MS**

"...you guys do great work. Excellent quality, reasonable cost and always on-time delivery. Keep it up."

— **President, Aspen, CO**

"...Outstanding! ...I got a great quote from your website...I showed your boards to some PCB Designers and they were very impressed with the quality and the 3 day turn price.

So I rate Sierra as:

Quality: A+

Accuracy: A+

Delivery: A+

Cost: A+

You will always have my business if you maintain this level of service."

— **Consultant, Milwaukee, WI**

"..Thank you and your team. I appreciate your boards and service and we will have another design for you in the next couple of weeks..."

— **CEO, United Kingdom**

"The prototypes were great. They are production quality product. Excellent work!"

— **Director Engineering, Rohnert Park, CA**

"...your whole process is fantastic. From ordering the boards, submitting the Gerber files, tracking the progress of the order, shipping, delivery, packaging and all the way through to product quality, I must say you folks are first rate!"

— **Vice President/COO, New Hartford, NY**

Sierra Circuits has had outstanding relationships with the following customers since 1986:

Thermo Fisher Scientific
Tucker Davis
Boston Scientific
Siemens Medical
Design for vision
St. Jude Medical
Medtronic
Lockheed Martin
Apple Computer
Power Design Services
The Boeing Company
National Semiconductor
ICE Circuit Connections
Battelle Laboratories
GE-Intelogix
Silver Engineering
Naval Undersea Warfare

Hewlett Packard
Liberty Laboratories
University of Texas at Austin
Kyocera Wireless
Vision Research
Massachusetts Institute of Technology
Marvell Semiconductor
Arichell Technologies
Stanford University
Fairchild Semiconductor
Formfactor
Texas Instruments
Pole Zero Corporation
XM Satellite Radio
Circuit Shop
Rockwell Automation

Logic Product Development
NASA
Transwitch
Brandt Electronics
Rice University
Aeroastro
Global Payment Systems
Meade Instruments
Motorola
Orbital Sciences
UC Berkeley
United Defense
Vishay Siliconix
Microsoft
Colorado VNET
Honeywell

OUR COMMITMENT

To meet and exceed our customers' expectations for Quality¹, Technology², Delivery³ and Price⁴ while achieving the highest levels of customer service⁵ and satisfaction⁶.

- 1** Anyone can say "Quality," but we know how to back it up. It's not just that we are ISO 9001:2000 certified, Mil-Spec certified, or NASA flight board certified. Every PCB we make comes with an Evidence of Quality report showing exactly what we mean when we say "Quality."
- 2** Direct imaging, smart drilling and reverse pulse plating are a few reasons our technology is both cutting-edge and cost effective for our customers.
- 3** We have a documented on-time delivery of 99%+.
- 4** Starting from \$34 for a 2-layer 'No Touch' board online all the way to a custom priced special technology board, all our products are competitively priced.
- 5** From the moment you call us, we will assign you an Account Representative to ensure you always receive reliable service.
- 6** Your unquestionable satisfaction is our goal, backed by our guarantee.

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